

We Claim:

1. A method for separating particles utilizing at least in part optical forces, comprising the steps of:

providing a population of particles,

5 first illuminating the particles with a line of light, and moving the line of light relative to the particles, so as to arrange the particles in a line, and

second moving the line of illumination relative to the particles having been in the line, at a speed to effectively separate some of the particles arranged in a line.

10 2. The method of claim 1 wherein the first moving of the line to collect particles is at a uniform speed.

15 3. The method of claim 1 wherein the direction of the first movement is opposite to that of the second motion.

4. The method of claim 1 wherein the sample field is sectioned.

20 5. The method of claim 4 wherein the sectioned field is an $n \times n$ array.

6. The method of claim 1 wherein the second motion is a step motion.

25 7. The method of claim 6 wherein the step motion moves less than $\frac{1}{4}$ of the field distance.

8. The method of claim 1 wherein the relative motion of the light relative to the particle results from movement of the stage.

30 9. The method of claim 1 wherein the relative motion of the light relative to the particle results from movement of the light.

10. The method of claim 1 wherein the relative motion of the particles and the light is substantially $6\mu/\text{second}$.

11. The method of claim 1 wherein particles separate red blood cells from white blood cells.

5 12. The method of claim 1 wherein particles separate maternal blood cells from fetal blood cells.

13. The method of claim 1 wherein the second motion is at a speed less than the escape velocity of at least certain of the particles in the population.

10 14. The method of claim 1 wherein particles separate maternal blood cells from fetal blood cells.

15 15. The method of claim 1 wherein particles separate reticulocytes from mature red blood cells.

16. The method of claim 1 wherein particles separate out stem cells.

20 17. The method of claim 1 wherein particles separate out tumor cells from blood.

18. The method of claim 1 wherein the population includes sperm cells.